Effect of water on lattice-preferred orientation of olivine and implications for seismic anisotropy in subduction zones

Ikuo Katayama[1]; Shun-ichiro Karato[2]

[1] Department of Earth and Planetary Science Systems, Hiroshima University; [2] Yale University, Department of Geology and Geophysics

The complex seismic anisotropy is reported in subduction zone upper mantle, in which fast shear wave polarization is normal to the subduction direction (parallel to trench) while most of oceanic mantle show the fast propagation direction parallel to the plate motion. In previous studies, this is considered due to complex flow geometry in the wedge mantle. However, we found the dominant lattice-preferred orientation (LPO) in olivine, which controls the seismic anisotropy in the upper mantle, is sensitive to water content and temperature as well as differential stress by performing high-pressure deformation experiments. In this presentation, we will show that the complex seismic anisotropy in subduction zone can be caused by changes in the dominant type of olivine LPO due to the spatial variation in water content and temperature in subduction zone rather than the complexity in flow pattern.